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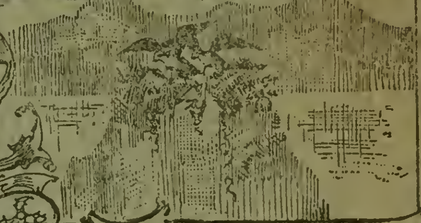
THE OSPREY



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of BIRDS & NATURE

Complete Series,
Volume VI.

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THE OSPREY.

An Illustrated Magazine of Popular Ornithology.

Published Monthly.

VOLUME I. (New Series). JUNE, 1902. NUMBER 6.

THE MISSISSIPPI KITE (*ICTINIA MISSISSIPPIENSIS*).

BY ALBERT FRANKLYN GANIER, Vicksburg, Miss.

The Mississippi Kite is well distributed over Warren County, Miss.; in fact it is by far our most common bird of prey, inhabiting hill-land and swamp-country in apparently equal numbers.

Ictinia mississippiensis is our only representative of the kite kind with the exception of the swallow-tailed which pays us an occasional visit during migration. Late in the spring, about the last of April, the Mississippi Kite returns from its winter home and takes up the range occupied the previous year. I cannot say whether they remain mated through life or not, but I believe they do, as they will use a nest for several seasons if unmolested. Once more in their summer retreats they begin to reline the old nest, or in case there is a new one to be built they do not delay long to gather materials.

While on a trip in the northern part of this county during the early part of last June, I had the opportunity to observe a pair building a nest in a tall gum tree in the edge of a small wood. Having noticed them darting in among the trees from an adjoining field I soon guessed what they were about, and, having made my way unobserved through the low bushes until I was almost under the tree which seemed to receive most of their attention, I hid myself in order to better observe the action of the birds.

On looking up I was surprised to find them soaring high in the air, apparently with nothing more upon their mind than to satisfy their appetites. Suddenly, however, one of them remained stationary for a second, then with half-closed wings came swift as an arrow down through the trees and reappeared above my head with an oak twig in his talons; wheeling, he sailed swiftly upward to a crotch in a gum tree, which showed a bunch of sticks, the beginning of a nest. Only for a moment did he remain; then, dropping over one side of the nest, he sailed upward and rejoined his mate.

For over an hour and a half I lay there and watched them slowly constructing their nest; both birds worked, darting in among the trees as on the first occasion, and reappearing with either a twig or spray of green leaves. At last, as the midday hour began to cast short shadows, one of the birds perched on the edge of the nest, while its mate lit on the topmost branch of a cottonwood tree some two hundred yards away. Seeing that work had been temporarily suspended, I left the locality and was unfortunately prevented from making any more observations on this pair, as I had to return to the city the next day.

Any day in the summer, a few miles ride into the country will bring one upon a pair of these birds, yes, often a half dozen of them. On one occasion, on the 10th of last June, sixteen were seen sitting on a single dead cottonwood tree. At another time I counted twelve of them, chasing what seemed to be a drove of insects.

There is no more fascinating sight than to lie under the shade of some tree and watch the beautiful flight of a pair of Mississippi Kites, first skimming low over the tree-tops, then ascending in ever widening circles until it is painful to the eye to watch them soaring so high in the air, with never a flap of their wings, but suddenly one appears to spy some choice insect far below him and, half folding his wings, he shoots like a meteor, head downward, to within a few feet of the earth, seizes his prey, and ascends almost as fast as he came, all this without any apparent movement of the wings. When he has reached an elevation of seventy-five or one hundred feet, he circles about and leisurely eats his grasshopper piece by piece, holding it, the while, in both feet. A specimen, shot in the late summer of 1900, had just alighted after a flight in search of food, and, when examined, was found to have its bill and feet covered with insect scales, while its under tail coverts were much worn and frayed, doubtless through constant contact with live insects.

Audubon in his unrivaled "Birds of America" states that he never saw the Mississippi Kite alight on the ground: I have been more fortunate in this respect, for on one occasion I noticed a bird alight on the ground in a cotton field and remain there at least a minute. Another thing I have noticed is, that the birds will as soon alight in the top of a green tree, among the leaves, as on a dead snag. In '97, before I became well acquainted with the Mississippi Kite's food habits, I determined to test its beneficial qualities, so, procuring a young chicken about a month old, I carried it to a well-known Kite resort, and staked it out on a bare hill top.

As I had expected, the Kites were there in full force, and I had a splendid show to watch them; at least four of them passed within fifty feet of the chicken, which was chirping quite loudly, but none showed the least desire to molest it, but playfully gamboled about in the air above, chasing and diving at one another like children at play.

The "Blue Darter" or "Mosquito Hawk", as this bird is locally called, seems to have little or no fear of man; many times I have ridden within twenty feet of one resting on some small tree. At other times they will catch and eat their prey within a few feet of the passerby's head.

A peculiar trait of the Mississippi Kite is that all of their food is caught with their talons, and it is a rare occurrence that an insect is missed. Locusts, or Cicada, form a large percentage of the Kite's food and as usual are caught in mid-air. When one of these insects finds himself the object of a Kite's downward plunge, he gives vent to the most ridiculous cries and seems to go almost crazy with fear.

However gentle this bird may be when feeding, it is quite the opposite when their homes are intruded upon by the collector. To illustrate the bird's fierce nature at such times, I will relate the experience I had at one of the first nests I found of this species. On the morning of the 22nd of June, while passing through a small gum and oak wood, making a special search for Kites' nests, I was at last rewarded by seeing one, sixty-five feet up, in the tip-top of a slender gum tree. Walking to the base of the tree I gave the grape vine, which was suspended from it, a pull, and the old bird left the nest without a cry. Having no climbers with me I left the nest, and returned with these and other necessary articles in the evening and began the climb.

I had scarely made half the distance when three or four Kites began to circle about on a level with the tree-top, and as I seated myself to rest on a branch, twelve feet below the nest, one of the birds began to dart at me. It was a very pugnacious fellow and would circle around within twenty-five feet of me until it would catch my eye; then, pausing for a moment, it would dart directly at me, to within six or eight feet of my face, when it would swoop suddenly upward, emitting at the same time a sharp shrieking cry. This performance was kept up until I descended, the birds darting closer as I reached the nest. Looking over the edge of the nest I saw to my surprise only a single egg, which was warm; this I left hoping to secure the full set later.

The next day, June 23, found me strapping my climbers on under the the tree. I rapidly made the climb but imagine my chagrin when on looking over the edge of the nest I found the egg broken into small pieces, and as there were no Kites about, I decided that the owners had destroyed their egg. Bloody stains on the shells indicated that incubation was well advanced. The ground color of the egg was bluish white; while creamy and light brown markings, resembling stains, covered about a third of the shell.

This nest was placed in a double fork, six feet from the top of the tree, and was composed of sticks and twigs with a thick lining of locust, gum, thorn and other green leaves. Before descending I measured the nest and found that it extended 25 inches from tip to tip of the longest twigs, while the width of nest proper was 14 inches; the area covered with green leaves being 6 inches square. The nest as usual was almost flat on top.

On May 26, this year, two typical nests were found. The first was placed sixty feet up and nine feet from the top of an oak tree, which was situated in a narrow strip of woods. This nest was begun and almost completed last July, so this year, after doubling the materials, the birds put it in use. After an easy climb I reached the nest and secured the one egg, which was bluish white in ground color, with all of one side a dirty brown color, while the other side showed a few splashes of yellowish brown; the measurements were 1.61x1.34.

The other nest was placed eighty feet from the ground and six feet from the top of a large gum tree, situated in a well wooded pasture. This nest was much larger than any other Kite's nest I have ever examined and was composed to a large extent of gray moss, material not noticed in other nests. This nest was observed last winter and has probably been used for several seasons.

The birds were also unusually aggressive when I reached their home and secured the egg. Even a week later, when I returned with my camera to photograph the nest, one of the Kites darted quite earnestly at me. This egg measured 1.59x1.34.

On July 8, I determined to spend a few days in the lower part of this county. The following morning after a pleasant trip found me stopping at Newtown Landing, which is situated on the Mississippi River some twenty miles south of Vicksburg. It was not long until I found that Mississippi Kites were abundant and I soon located a nest ninety feet up, near the top of one of the big river-bank cottonwood trees. The nest could plainly be seen from several points and I soon made out the form of a young bird on the edge of it, looking out among the trees and occasionally spreading its wings as though impatient to be free.

While still looking, a shadow glided through the trees and an old bird lit on the edge of the nest with something in her beak; slowly the young bird turned around to receive its food and then assumed its old position. The parent bird lingered but a minute, then glided away as silently as she had come.

I sat on a log and watched them for an hour, the parent birds taking turns at feeding the young one, whose restless wings seemed to trouble him much more than his appetite. I watched the youngster for an hour or two for several days until my affection for him grew so strong that my gun was commissioned to add his skin to my collection. The young Kite proved, as I had expected, greatly different from the old birds; the head and neck was covered with white down; the breast, belly and thighs were also covered with down, but this was interspersed thickly with reddish brown feathers; the back and rump were covered with black feathers edged with brown, while the under tail coverts were of salmon color. The twelve tail feathers were black, tipped with white; the primaries were black, tipped with white, while the tips of the secondaries were brown. The feet were yellow, and the eyes milky brown. The bird measured 12 inches from tip of bill to tip of tail, and 26 inches from tip to tip of wings. The stomach contained nothing but a quantity of cicadas and horseflies.

A few days after, while walking through a clearing, I noticed a nest in an inaccessible cottonwood tree; I examined it from the ground, and later, by mounting a stump, I obtained a good view of the nest and saw two young birds gazing over its edge. Sticks and clods of dirt soon brought the parent birds and five or six more additional Kites, all of which circled about with the exception of one which lit on the nest.

Two days after, shouldering my axe and my gun, I made my way to the clearing. Once there the task seemed a big one; the tree was over two feet and a half in diameter, but after an hour and a half I had the satisfaction of seeing the big fellow come crashing to the ground; "two more immature specimens for my collection", I thought, as I hurried toward the topmost branches, but investigation proved that the nest was empty and, as no old birds were about, I decided the young had left the day previous. The nest was a mass of sticks lined with cottonwood down and green willow leaves. Taking my gun I measured the tree and the nest; reducing this to feet, I found that the tree had been one hundred and thirty-one feet high and the nest at the height of one hundred and nineteen feet. One would imagine that with Kites so numerous, nests could be found quite plentifully. This is not so, however; the principal reason, perhaps, is that the nesting only commences in the summer, at which time the leaves have grown so dense that it is almost impossible to see any nest situated far from the ground. Another reason is that they show a great preference for the tip-top branches of gum and cottonwood trees whose dense foliage is almost impenetrable to the eye.

Of all the nests which I have examined only one was found to contain more than a single egg or young, although other writers mention two as an average, and sometimes three. The ground color from the outside seems to be white tinged with bluish, but if an egg is held up to a strong light and looked at through the blow hole, the color is a deep blue. As for the markings, I am convinced that the creamy splashes are not nest stains but are characteristic of the eggs.

I will refrain from a description of the old birds, but the principal measurements of three skins now in my collection may interest some; the largest measures from tip of bill to tip of tail, 16¾ inches, wing expansion, 37 inches; the second, 36¾x16, and the third, 34½x13½ inches.

Near the middle of August the birds seem to be very active at feeding; evidently they are then preparing for their southward journey. A specimen shot in the last days of August was so fat that I found it impossible to make a first-class skin of it; the breastbone sank far below the level of the breast meat.

As the first days of September approach the last individuals may be seen slowly flying southward; then the woods lose their charm to me for the sky has lost its gem, the Mississippi Kite.

RECENT VIEWS OF THE SABLE ISLAND OR IPSWICH SPARROW.

By W. E. Saunders, London, Can.

A little more than eight years ago Dr. Jonathan Dwight, Jun., visited Sable Island for the purpose of studying the habits of the so-called Ipswich Sparrow and published the results of his observations in an excellent monograph of the bird . In 1901, I also made a visit to the island and the chief pleasure anticipated was the opportunity for observing in nature the same bird. I have already published the principal results in the Ottawa Naturalist in an article on the "Birds of Sable Island, N. S. " but reproduce them now in a more connected form. The difference between the species in 1894 and 1901 will be noticed with interest.

Sable Island lies about sixty miles south of the nearest coast of Nova Scotia, and 150 miles, a little southeast, from Halifax. The island is in the form of an elongated crescent, with its concave side to the north. It is nearly 25 miles long and only about a mile wide in most places. At each end it tapers down to a point of bare sand without any sign of vegetation whatever, and over them the sea sweeps at every high tide, and with every stormy wind.

Most people who have any idea at all about Sable Island think of it as a desert sandbar, over which shaggy ponies glean a scanty subsistence from the tough native grasses and on whose shore many lives have been sacrificed by shipwreck during the past three hundred years; but I viewed the island from an ornithological standpoint, and as usual the point of view made all the difference in the world. Instead of being a desert island on which there was scarcely anything to interest one, it had for several years been known to me as the only home in the world of the Ipswich sparrow, and so far as I knew only one ornithologist had enjoyed the privilege of seeing this bird during the season of housekeeping. It is called the Ipswich sparrow from the fact of the first specimen having been killed by C. J. Maynard near Ipswich, Mass. Had its life history been fully known when it was named it would of course have been called the Sable Island sparrow, and such should be its name now, for not only is Sable Island the only breeding ground in the world, but an island upon which no other land bird breeds. When an ornithologist has an opportunity of visiting a bird whose summer home is so little known, there is small wonder that he should forget all about the reputation of the island as a desert and think only of the rare treasure, ornithologically speaking, which is to be obtained there.

So it may be imagined that I very gladly accepted the invitation to be one of the party that was to reach Sable Island on May 16, and remain till the 23rd to make some experiments in planting the island with forest trees; and looking back on our trip it must be said that not only were my expectations of enjoyment more than realized, but even other members of the party who had no great expectations were very loath indeed to leave when the last day came.

More than forty persons have their constant residence there, and the men are employed in the work of the life saving stations and the two lighthouses.

As the inhabitants are all government employes, there is no commerce on the island. All supplies have to be brought from the mainland, and most of these are provided by the government which sends a vessel twice a year to supply the needs of the inhabitants. Sometimes these visits are postponed, as was the case in October, 1900, when it was found impossible to send supplies at all; and the boat which should have reached the island at that time landed its cargo, after two attempts, in the month of March. This delay caused a waste of 100 barrels of cranberries, which had been picked for the market and which are about the only agricultural export the island yields.

It might be supposed that life on such a comparatively dreary island, with but few opportunities of communication with the great world without, would be found inexpressibly dreary and irksome and that the inhabitants would seize with eagerness the first opportunity of leaving for life in what most people would consider a more congenial place. But not only is this not the case, but the reverse is true, namely, that when a man has once seen service on the island and leaves, it is usually not more than a year or two until he applies for a fresh berth on the lonely isle. A naturalist whose eyes and ears were constantly open to the beauties and glories of nature might easily become reconciled to such a life, but it is rather a surprise that people in the ordinary walks of life should show the same leaning, yet such is the case. Possibly the reason may be that the employes are engaged directly in the ennobling and philanthropic work of guarding against danger, and alleviating human suffering, and that gives this life its charm.

My first thoughts on Sable Island were not for the success of the forestry experiment, but for the little birds who made this strange island their only home, and my ears were on the *qui vive* for the first notes; and although it was foggy and rainy, as we approached the superintendent's house I could hear some sparrow-like chirps, and in a moment or two I heard the first song of the Ipswich sparrow, and was delighted to think that I would have them at such close range as the front yard of the house in which I was to stay. They proved to be very common, and one could hardly go to the door without seeing on the board walk which stretched away through the hay field, a pair or more, while their song could be heard at almost every moment of the day from the same point of observation.

The Ipswich sparrow, which was the chief attraction to me on Sable Island, is an insular race of the Savanna sparrow of eastern North America. In the struggle for existence for thousands of years on this bleak little island, the bird has become considerably larger and and much paler than the continental form. The increase in length is about 13mm., or 8 per cent. The breeding ground of this bird was for many years unknown, and not until 1894 was the bird fully studied and written upon. Previous to that time it was known as a migrant from Georgia to Maine and Nova Scotia, and was a straggler to Newfoundland, but it then disappeared from sight, though it was vainly hunted in the breeding season on Prince Edward and Cape Breton islands and in Newfoundland. At last a few shrewd guessers surmised that it must breed on Sable Island, and finally a skin sent from there in summer settled the matter, but its summer history was not known until Dr. Jonathan Dwight, jun., of New York, braved the inconveniences of the passage to the island, and spent three happy weeks there in May and June, studying the summer habits, song, etc., of this interesting species. Shortly afterwards he published a complete and very interesting monograph of this sparrow, including also an account of the history, climate and other features of the island, thus giving to the world the details that had so long been wanting.

I was far more favored in my visit than he, as the season was more advanced, and the weather brighter and more favorable, and I found that the intervening period of time had been auspicious for the sparrows, as they were much more abundant than he represented them to be in 1894. I found many nests, most of them being incomplete, but in seven instances I was able to take sets of eggs, four containing 5 eggs, and the remaining three 4, showing a marked difference from the Savanna sparrow, which almost invariably lays 4 eggs near London.

The variation in the colors and markings of eggs is very great, some resembling those of the Savanna sparrow; others with a lighter ground and larger blotches resemble those of the Vesper sparrow, while one set has very small spots and is of a general slaty hue, resembling the eggs of the horned lark, and yet another closely resembles some sets of the bobolink. The nest is built in a similar manner to that of the Savanna sparrow, an excavation of nearly an inch being made among long, fallen grass of last year's growth, and the nest is seated in this excavation and built up about two inches above the ground level. It is well concealed and would be difficult to find were it not that the bird is very particular as to the proper condition of grass, and as this condition is rather unusual, one's search is reduced to a trifle. Towards the eastern end of the island, where the crowberry (*Empetrum nigrum*) grows abundantly, a patch of it is often selected as a nesting site, and the task of discovery becomes more difficult.

The song resembles very closely that of our species, but the ending, instead of being a grasshopper-like buzz, as with us, is aptly described by Dr. Dwight as "pre-e-e-a." Reading these letters in a book conveyed no very definite idea of the sound to my mind, but when I heard it I realized that not only was the description very accurate, but that the sound was almost exactly the same as the call of the tern, which, doubtless, the bird has acquired by dint of hearing this cry thousands of times each day, all summer long. That such changes do take place was proved to me some years ago by hearing a junco, that lived in a region of white-throated sparrows, render his song, not a plain series of "chips," as usual, but "chip-chip-chip....chip-chip-chip-," etc., in triplets, exactly as the white-throat does.

While the Ipswich sparrows are found during the migration as far south as the Carolinas, it is a remarkable fact that a fair proportion of them reside on Sable Island all winter, the number remaining being usually estimated at about one-fifth of the total. During severe weather many of these are sometimes picked up exhausted and chilled, and are then sheltered and fed till a better season arrives. And not only are the birds themselves thus cared for, but the foxes, which are the chief enemies of this and other birds on Sable Island, are unmercifully pursued at every opportunity, and in the winter a systematic attempt is made to kill them by traps, poison and the gun. Their numbers are now very much reduced, and the work still proceeds, so that there is quite a possibility of their utter extermination within a few years.

NORTHERN PARULA WARBLER.

By J. Merton Swain, Portland, Me.

Although I have observed this sub-species as a common migrant in Franklin County, Maine, and have felt positive that it has been breeding in the northern part of the county for several years, yet I have never had the good fortune to examine its nest, in situ, until the spring of 1900. And as usual, when the first nest is found, it seems "no trick at all" to find others, as, after finding the first nest, I readily found and examined about a dozen others during the season.

I would look for this tiny woodland warbler to nest, in the state, where-ever the long folds of usnea lichens (*Usnea longissima*) are found in abundance.

I had looked for the nest of this warbler for a long time, but unsuccessfully until the year above mentioned. On June 9th, while visiting my friend Mr. C. H. Morrill, at Pittsfield, Maine, we had taken his boat and paddled about the lake, examining and photographing nests of Bronzed Grackles, Red-wing Blackbirds, Pied-billed Grebes, Swamp Sparrows, Oven Birds and Water Thrushes, Tree Swallows, and several others, and as we landed on a point that made out into the lake, we heard the pleasing t-z-z-z-r-p of the Parula, as it fed busily in the taller trees, along the shore. Its song, uttered in a slow, drawling tone at first, but rapidly increasing and finishing up with a sharp accent on the last zip. This song was repeated at intervals of from a half minute to a minute.

We felt positive that this bird must be breeding near the shore, as there was an abundance of evergreen trees, fairly covered with long folds of usnea, hanging from their branches. While Mr. Morrill went to photo nests of the Oven-bird and Wilson's Thrush, found previously, I remained near the boat, looking for the nest of a pair of Water Thrushes, which were gathering food for their young, among the fallen trees and drift-wood lying along the shore. As I stood out on a log at the edge of the water, watching the Water Thrush tipping along the edge of the water, I saw a Parula flit to a fold of moss just over my head about fifteen feet up. The lichens hung from a limb of a dead fir balsam about three feet out from the trunk. The bird began to pull and arrange the moss into a nest-like shape. While watching her thus at work, I noticed a similar fold of lichens growing from a limb on the opposite side of the same dead stub and at about the same distance from the ground. This fold had the appearance of being a completed nest. I climbed up to it and sure enough it was a completed nest. The female flushed from the nest and on examination I found it contained four fresh eggs. I called Morrill and together we watched the other bird working on her pendant domicile, but we could make no photos of either nest in situ.

Mr. Morrill returned to the spot on June 24th and the nest first observed under construction had been completed and contained four eggs also. It was a very pleasant incident to me that we should find these birds nesting in the tree so near neighbors. This tree was standing out at the edge of the water, as the water had flowed back several feet from the former high water mark. At last I had learned to know where to look for the nest of the Northern Parula Warbler, aud later, as I was driving along the roads or rambling in the woods, where the usnea was abundant, in Knox, Lincoln, Waldo and Cumberland Counties, I was on the alert for the song of this woodland sprite and examined many likely looking folds of lichens with good results.

June 24th I took the Harpswell Steamer for Cliff Island, Casco Bay, to stay over Sunday with a friend who was interested in the birds. There seemed to be about a dozen pairs of Parulas nesting on this small island. While watching a tiny nest of a Ruby-throat Hummer on the limb of a fir tree with its two tiny inmates about one-third grown, I saw a Parula fly to a bunch of usnea hanging from the limb of a Spruce in front of one of the cottages. On examination I found it contained four young. I also examined four other nests in the immediate vicinity, one of which contained one egg laid by the owner, and an egg of that pest, Molothrus ater, which had caused the Parula to desert the nest. Then I crossed in a small boat to Jewell's Island, a larger, outer island, where once the Raven had nested in security before the ruthless gunner had worked such changes ''down the bay.,'

Our principal object in visiting Jewell's Island was to ascertain how fared the little colony of Bob-white, which Mrs. McKenney, (who has a summer cottage thereon and who leaves a man the year around to care for the stock and poultry which she keeps there,) had brought from Pennsylvania and liberated on the island. While on this island we found two more nests of the Parula, each containing four eggs. One of the nests was a model of beauty; it hung out on a limb of a fir balsam, that grew on the edge of a high cliff near the shore. The wind had uprooted this tree and it hung out over the steep side of the cliff. The nest was difficult to locate as the tree was covered with folds of usnea, but a few bits of dead grass, the lining of the nest, were protruding from out the folds of moss and gave the site away.

In the month of June, the present year, Mr. Morrill and myself went to the locality where the two nests were found on the shore of the lake and found that one pair of our Parulas were nesting in a spruce near the last year's site. Each nest I have examined is a marvel of beauty, made up as they are almost entirely of usnea, with but a slight lining of hairs or dead grass. The male usually is found, during the period of incubation, feeding among the foliage of the taller deciduous trees near the nest site, occasionally flying to the nest to see if all is well with his little home and mate. His song is a very pleasing one and is very distinct from any song of our other N. E. Warblers. Of the several nests I have examined all but one were constructed in a natural fold of the lichens, the bird only parting the folds and hollowing out a small apartment and slightly lining it. In one nest, only a small fold of usnea was chosen to start with, the birds carrying long folds of the usnea and wreathing it about the limb forming a pendent nest, leaving a small aperture, a small round hole directly under the limb from which it hung, about large enough to insert one's small finger. Each nest examined had this small round entrance except one. This one was in a natural fold of usnea hanging from a limb, with an entrance at the top similar in construction to a Vireo's nest. No pen description can do these tiny nest-builders justice, as each nest is a model of beauty, and in nearly every instance the fold of moss containing the nest and eggs, with the bird sitting thereon, is so inconspicuous having only the appearance of a very innocent piece of usnea waving gently in the breeze. The nests are usually placed in a hard position to get a photograph of, but I have suceeded in getting several very good ones with which I had intended to illustrate this article, but through an unfortunate and unavoidable circumstance my plates were destroyed after development.

NOTE ON THOMAS B. WILSON.

In the Osprey for April are reproduced two photographs of Dr. Thomas B. Wilson taken in 1860 or 1861. These were associated on the same plate with one of John Cassin because he was to a large extent the cause of Cassin's activity and the one who supplied him with the means of investigation through his munificent gifts of bird skins and mounted specimens to the Academy of National Sciences of Philadelphia. By those gifts he did more to advance, thus indirectly, the study of exotic Ornithology in the United States than any other person. He was born in Philadelphia in 1806 and died at Newark, Delaware, on the 15th of March, 1865, and appointments were made of biographers by both the Academy of Natural Science and American Philosophical Societies, but the duties were never fulfiled. We hope to be able to present one at some future time from the pen of Mr. Witmer Stone.

NOTE ON GEORGE A. McCALL.

General George Alexander McCall, forming with Cassin and Wilson the trio of Philadelphia Ornithologists, is better known to the world at large as a naturalist, but he did some good work in ornithology. He was born in Philadelphia on the 16th of March, 1802, and died in West Chester, near it, 26th of February, 1868. He served in both the Mexican and Civil Wars and durthe former observed the birds which he subsequently commented on. The photograph was taken in 1861 and presented to Dr. Gill.

throughout the vertebrate series. Numerous important characters are to be met with at the base of a bird's skull. A small bone, the vomer, may or may not be present, while the delicate palatines and pterygoids take on many forms. Their relations to each, their articulations, and the morphology, of the bones of the avian palate,—the maxillo-palatines, the palatines and associated elements,—have, by Mr. Huxley long ago been described and their differences and agreements employed in taxonomy. The vomer is a single median bone, while the palatines and pterygoids are paired. The latter upon either side articulate with the quadrate, and anteriorly with the corresponding palatine. In a bird, as in many other vertebrates, the "base of the cranium" is the most solid part of all the skull. It is made up principally of the basisphenoid, the occipital segments, the basitemporal, and in part some of the elements of the sphenoidal group. Chief among the features at the base of the cranium is the large subcircular opening found there,—the foramen magnum,—that transmits the spinal cord as it passes to the brain. In the median line, on its anterior margin, we find a sessile, subhemispherical process, which is the *occipital condyle*, and it articulates with the first cervical vertebra (atlas) of the spinal column. In this character, as in so many others, birds agree with reptiles, while in the class mammalia, to which man belongs, there is a pair of occipital condyles, one upon either side of the foramen magnum. With but few exceptions, the lower jaw of a bird, or its *mandible*, is always in one solid piece in the adult, while in the growing chick or fledgling, it is found to be composed of a number of pieces or separate bones. There are *five* of these. They are the dentary which articulates or anchyloses with the fellow of the opposite side to form the symphysis at the distal end; the splenial, the angular, the surangular, and finally the articular, which forms the free posterior extremity fashioned to articulate with the quadrate upon either side. Development of the jaw-bone takes place about Meckel's cartilage or the meckelian rod, a structure that is absorbed in adult life. Several of the characters of the lower mandible in birds are of classificatory value, not so much in the ramus or vertical lateral part of the bone, as the processes of the articular ends, more particularly the posterior articular process that, when developed, protrudes from behind the articular cups of the hinder free mandibular ends.

In the VERTEBRAL COLUMN we find an unusually long, and flexible cervical portion or division, composed of numerous free vertebræ. Sometimes, indeed very frequently, the lower cervicals bear ribs, and in a few cases a cervical vertebra may fuse with the first dorsal to form the compound vertebral piece of the rigid dorsal division of the column in some birds. Often, however, the dorsals are free, though they never possess the freedom of movement seen in the cervicals. More or fewer of them connect with the sternum through the intervention of the sternal or costal ribs.

The thoracic and lumbar regions of the vertebral column are not defined as in the mammals, since the dorsal vertebræ support ribs, and the lumbar ones fall beneath the pelvic bones and enter into the formation of the pelvic sacrum. In any bird the number of cervical vertebræ always exceed those found in the dorsal region. In the cervical division of the column there may be as few as nine or as many as twenty-one as in the Swan (*Olor*). *Geococcyx* has but four dorsal vertebræ, which is about the minimum number. The thoracic ribs may or may not support unciform processes midway upon their posterior borders, though it is the rarest exception that they do not (*Palamedea.*) These processes may or may not anchylose with the ribs that possess them.

In the vast majority of species of birds the sternum is a large bone, and in the adult completely ossified. Vertically and below it develops in the median plane, in most birds, a strong carina or keel for the attachment of the pectoral and other muscles, and for the protection of the internal organs of the thorax and upper part of the abdomen over which it extends. Those of the class lacking in the power of flight, as ostrich forms, owl-parrot and a few others, have keelless sterna, but in all other forms it is more or less developed. Posteriorly its border may be entire and without fenestræ, or it may be more or less profoundly cleft once or twice, but no more, upon either side of the carina, or it may be variously fenestrated in that region The costal borders bear facets for the costal or sternal ribs (*hæmapophyses*). Anteriorly it is transversely grooved to articulate with the coracoids, and it may or may not possess a manubrial process in front. In *Opisthocomus* and a few other birds, the clavicles meet the manubrium to anchylose with it, while in others we find the contact very intimate, but coössification rarely takes place.

When birds come to be fully adult, the three bones (*ilium*, *ischium*, and *pubis*) fuse thoroughly together, and the two halves of the *pelvis* thus formed unite with more or less closeness with the interdorsocaudal vertebræ and thus form the compound bone called the *sacrum.* The vertebral part of this consists of more or fewer presacral vertebræ, two sacral vertebræ, and a series of postsacrals, all firmly anchylosed together. The sacrals, corresponding to the sacrals in the Lacertilia, are situated between the pelvic acetabula, giving unusual strength in that region where the pelvic limbs are articulated. Some of the presacral vertebræ may support true ribs (dorsals), and in a few instances these may connect with the sternum by means of costal ribs.

Examples of broad pelves are seen among the fowls (grouse, etc.), while extremely long and laterally compressed ones are found among such divers as the loons and grebes. In the ostrich (*Struthio*) there is a pubic symphysis, and an ischiac one in *Rhea*, but in all other birds the pelvis is open below, and the pubic bones, as a rule, project posteriorly as more or less slender styles. In the postacetabular region the under side of the pelvis exhibits more or less of an excavation or concavity, the bones being fashioned to produce this as a receptacle and a protection to the contained viscera. This pelvic basin is ample and spacious in others (Grebes). An *acetabulum* is always perforated at its base; it is the cup in which the head of the femur or thigh bone of the leg articulates, and above it we find an antitrochanter for articulation with the same bone. In *Geococcyx*, the fowls, and some other birds, the pubic bone is produced a little way in front of the acetabulum as a *propubis* or propubic process.

The skeleton of the tail of all recent birds is composed of a few, but a varying number, of *caudal vertebræ* and a terminal piece, called the ploughshare bone, coccyx, or the pygostyle, it too being composed of a number of caudal vertebræ fused together into one piece. All of the caudal segments, apart from the pygostyle, are more or less rudimentary in character, becoming more and more so as we proceed posteriorly. Still, as in all true vertebræ, they possess a centrum, a neural canal, and tranverse processes. A few of the ultimate ones, however, in some forms, may even lack these characters. As the *pelvic* arch or "pelvic girdle" is the bone to which the pelvic limbs are articulated, so it is, at the anterior moiety of the body, we find the *pectoral arch* or *shoulder girdle* to which the skeleton of the wings are articulated.

Commonly in birds this is composed of five bones, that is, a pair of scapulæ, a pair of coracoids and the *furculum* or furcula. This latter U or V shaped arch is popularly known as the "wish-bone" or "merry thought" and is in reality the united clavicles, so in point of fact the shoulder-girdle is composed of *six*, or three pairs of bones. The furcula may be more or less rudimentary or even entirely absent. On either side above, its free end usually articulates with both coracoid and scapula, while below, in the median line, it often supports a well developed process, the *hypocleidium*. Occasionally, as in certain Swans, it is modified in form at its lower part by the windpipe or trachea.

In Ducks and many other birds the furcula is solid, while in Vultures and numerous others it is *pneumatic*, that is, air gains access to its interior through pneumatic foramina. In some birds the entire skeleton enjoys this condition (*Catharista*, for example) while in others, as the Penguins, it is almost entirely absent.

Each *scapula* is a long and cimeter-shaped bone, exhibiting a head, neck, and blade. The head developes a glenoid process which assists in forming the glenoid cavity for articulation with the head of the humerus, and an acromial process for the clavicular end of the fourchette or furcula. When *in situ* the blade of the scapula lies along the dorsum over the tops of the ribs and nearly parallel with the vertebral column.

A *coracoid* has a shaft, a head, which is the tuberous upper end, and an expanded lower extremity. This latter fits in the coracoidal groove of the sternum, already referred to above. When thus articulated it may meet the fellow of the opposite side, or it may even decussate with it, or cross it, while in *Rhea* the bones are widely apart in this place. Above, the coracoid contributes to the glenoid cavity about two-thirds of its articular surface. It has a clavicular process for the end of the furcula, and it also articulates with the scapula. In rare instances, anchylosis takes place between the scapula, coracoid, and end of the furcula, where they mutually articulate.

In all flying birds, whether existing or extinct, the pectoral limb, or skeleton of the wing, is well-developed, while in the flightless forms, such as the Kiwi, the Ostriches and *Hesperornis*, it is more or less aborted.

In any bird possessed of full volant power, the skeleton of the forelimb is divided into brachium, or arm, consisting of the *humerus*; antibrachium, or forearm, containing the *radius* and *ulna*, and the pinion, which is the *manus* or hand, where we find *two carpal bones*, the metacarpus, and the bones of the *three* digits,—*pollex*, *index* and *medius*.

As a rule, the *humerus* in all ordinary birds has both its proximal and distal extremities expanded; the first to articulate with the shoulder-girdle, and the latter to support the two trochleæ for articulation with the radius and ulna of the forearm. On its ventral aspect is developed a preaxial, or pectoral ridge for the insertion of the muscle of that name. When pneumatic, the foramina occur in the pneumatic fossa at the proximal extremity. Usually the shaft is cylindrical, smooth, and presents a sigmoid curve. It may be, however, more or less flattened and solid, as in the Penguins. *Radius* and *ulna* are both, long and slender, the former generally being not more than half the calibre of the last, and either may be straight for their continuity or gently curved or bowed. Distally, they articulate with the two bones of the carpal joint,—the *radiale* and *ulnare*. The ulna may show a row of bony papillæ down its shaft for the insertion of the quill-butts of the secondary feathers of the wing, and its proximal end, a process, the *olecranon* of the ulna. Near it is received the "head of the radius," and both articulate with the humerus. In the skeleton of manus in the Apteryx and in the *Casuariidæ* there is but a single complete digit, clawed at its extremity (index), while in all other birds, so far as known to the present writer, including the various forms of existing Ostriches, there are the three digits named above, the index having two joints, to which a claw may be added (swan). The much reduced medius digit never bears a claw in the adult. In the compounded metacarpal bone, the metacarpal for pollex is always very short, while the other two, united only at their ends, extend the hand, which extension is prolonged by the index digit. Many of the modifications of the skeleton of the wing in birds are extremely interesting, and in studying this part of the bony framework we must be careful not to overlook certain sesamoidal bones that may occur at the glenoid cavity (*humero-scapulare*) at the elbow; at the carpus (*os prominens*); and sometimes elsewhere.

Turning to the *pelvic limb*, or the skeleton of the leg, or lower extremity, we find it divided into the thigh, made up of the *femur;* the leg, containing the *tibia*, or more properly the *tibio-tarsus,* and the *fibula;* the foot consisting of the unusually long *metatarsal bone* and the *phalanges of pes.* Exceptionally the *tarso-metatarsus* is very short, as in the Man-o'-War bird (*Fregata*), while in others the number of digits may be reduced, as in *Struthio*, or their position altered (*Picus*, the Parrots, etc). Most birds have a *patella* in front of the knee-joint and this sesamoid may be double, or it may assume very remarkable form or size, or it may be pierced or grooved for the passage of the tendon of the ambiens muscle; or it may coössify with the elongated cnemial process of the tibio-tarsus as in Loons and Grebes. Penguins have, and the extinct *Hesperornis* had, large patellæ, while they are absent in Ducks and others.

The femur has a shaft and two enlarged extremities. Proximally, we find the head, a reduced "neck," and a prominent "trochanter major," while distally, there is to be seen the two large condyles,—an internal and an external one. The shaft of the femur may be straight, slender, and long, or, as in the Loons, it may be comparatively stout, short, curved, and the surface of its shaft roughened by lines, ridges, and tuberosities for muscular insertion.

Externally, in the skeleton of the leg, occurs the *fibula*, usually a very slender element. At its proximal end is an enlarged head for articulation in the fibular groove on the back of the external femoral condyle. With the tibio-tarsus, it articulates by a more or less extensive "fibular ridge," below which the bone often becomes rapidly spindle-form, and may terminate in a free needle-like extremity. The fibula may be complete in some birds (*Pandion*, *Sula*, and in certain Loons and Grebes), but in them it always fuses to the side and lower extremity of tibio-tarsus. Often it is very short and free, the abbreviation, however, always taking place below the fibular ridge of the main bone of the leg or the *tibio-tarsus.* This latter usually has a long, stout and straight shaft with enlarged extremities. Proximally, it articulates with the two condyles of the femur, while its head, anteriorly, may be produced upward to a greater or less degree as a prominent cnemial process,—very conspicuous in some birds, as in the Loons and the Grebes; distally it possesses two condyles, placed antero-posteriorly, and articulating, in the natural skeleton, with the upper end of the tarso-metatarsus; these condyles are the coössified astragalus of other vertebrates. Hence the propriety of calling this bone the tibio-tarsus. Above them, anteriorly, the shaft is grooved, and may be spanned obliquely across by a delicate osseous bridge, intended to keep in place the tendons of the extensor muscles as they play in the groove. Popularly, the next segment of the pelvic limb, or the *tarso-metatarsus*, is called the leg, though it properly belongs to the foot, being composed of the three fused metatarsal bones, with which the podal digits articulate distally. In life it is ensheathed in the horny podothecæ in most birds, which may be more or less skinny in others. Its upper end is fused with an epiphysis representing the remaining tarsal bones, often being produced backward as a process termed the hypotarsus. In embryo birds, and in some subadults, the metatarsal bones are distinct, while in the Penguins, large apertures remain between them throughout life. The first metatarsal (accessory metatarsal) is a greatly reduced bonelet, usually suspended by means of ligament at the lower posterior aspect of the main bone, and supports the *hallux* or first toe, when the bird possesses one. The trochleæ for the second, third and fourth toes are often more or less separated, and even produced as "trochlear processes." The clefts between them are produced as longitudinal grooves on the shaft above, and in the first groove to the outer side may occur a foramen for the passage of the anterior tibial artery. Game birds of certain genera, (*Gallus*, *etc.*,) have a "calcar" on the inner side of the lower third of the shaft of the tarso-metatarsus; it is covered with the horny "spur" in life. *Palamedea* possesses two such spurs.

The tarso-metatarsus is extremely short in the Man-o-War bird (*Fregata*), and notably lengthened in the waders and many limicoline forms, and the Secretary bird of Africa. In a state of great reduction, it is said that a fifth metatarsal has been found in birds, but it never supports any semblance to a toe. In fact, existing birds never possess more than *four toes*, of which the hallux has two joints or phalanges, the series throughout increasing one in each case, till we find the fourth toe with five joints. In some Swifts (*Cypselus*) the number of joints do not exceed three, while in not a few species of other birds the hallux or hind toe is entirely absent. In the Ostriches (*Struthio*) the second toe is missing, an exceptional case, and even in its fourth toe the joints seem to be on the road toward final disappearance, and in time, were it the fate species not to be exterminated by man, it might, in its descendants, become one-toed, as is the modern Horse and other *Equidæ*. The *Cholornis*, a passerine bird of Thibet, has nearly lost its *fourth* toe, while the hallux may be elevated or the reverse in various birds. Woodpeckers, Cuckoos, and others have one or the other of the outer digits reversed, while in the Osprey, Owls and others such toes are reversible or partly so. Jaçanas and many waders have the phalangeal joints greatly lengthened, while they are very short in the Swifts, but normal in number, and proportionately of immense size in the Humming-birds (*Trochilus, etc.*) Lack of space forbids the description here of many interesting skeletal variations in the pelvic limbs of birds, but we must not omit to notice the calcaneal and other sesamoids which may be found, the first at the back of the hypotarsus, of the tarsometatarsus, and others in the plantar region of the foot. In Owls and Ospreys there is a bony tendinal bridge seen on the supero-anterior aspect of the tarsometatarsus, that is a rare character in birds.

Ossification is also extended normally to some other structures, as the tendons of certain muscles; the rings and other parts of the windpipe (trachea); a platelet surrounding the optic nerve at the back of the eye (Raven), in which bird also a separate, small, siphon-shaped bone occurs in the region of the outer ear, that is functionally pneumatic and leads to the mandible. Osseous spurs occur also on the wings of certain birds, and the bony elements of the hyoid vary greatly, but, for the reason already given, they cannot receive the attention here that they deserve.

THE MUSCLES.

The science of the MUSCLES of birds is known as avian myology, and it is only in a comparatively few cases or species that the entire system of muscles of any bird has been written out, described, illustrated, and published. Still we have considerable knowledge on the subject owing to the special researches of numerous writers, past and present, into particular myological regions, as the muscles of the wings; of the syrinx; the femoral region; and others. The embryology, histology and physiology of the muscles of birds are all very extensive fields for research, and offer fully as much to be studied as these sciences respectively do in man and other animals.

Counting both single (azygos) and paired muscles, such a species as the Raven presents us with no fewer than one hundred and fifty-six muscles, and doubtless this number is practically the same in all typical passerine birds. To pretend even to name them here would alone take several pages, and their full description fill several volumes.

The *dermal system of muscles* is remarkably developed in all ordinary birds, and there may be as many as thirteen pairs of them. They perform various functions associated with the movement of the integuments; the agitation of the feathers; erection of crests and feathery ornaments; and, either directly or indirectly, perform other offices. As a whole, they have been erroneously considered by some writers as simply segregations of the *platysma myoides* and the "countless number of little slips" thus formed have, in a goose, been estimated to number at least twelve thousand.

Delicate pairs of muscles, as well as azygos ones, preside over the movements of the lingual apparatus; the trachea; and the eye and ear. Their study is full of interest. Moreover the intrinsic muscles of the head are by no means few in number. The *temporals* and *masseters*, by their contraction, close the jaw, and the *pterygoids*, *digastric*, and several other pairs are also represented.

In birds of flight, the three *pectoral* muscles are enormously developed; the *pectoralis major*, when contracting, depresses the humerus powerfully and thus gives the downward stroke to the wing in flight, the upward stroke being effected by the action of the *pectoralis secundus* and the *pectoralis tertius*.

The dorsal muscles in the Raven are fully represented, there being some fifteen (15) pairs of them, and among these we find the *latissimus dorsi*, the *trapezius*, the *rhomboideus*, and others.

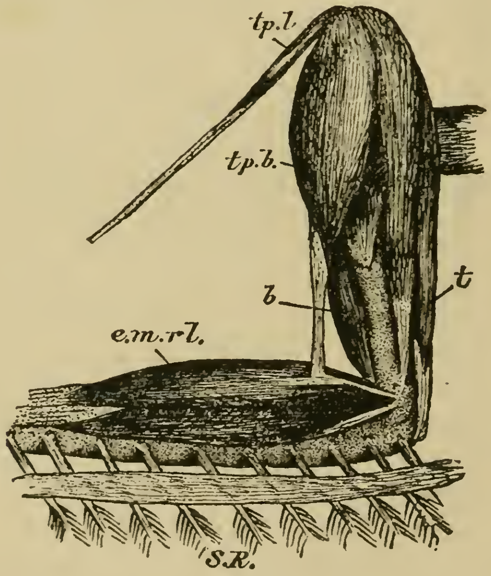

Fig. 3. Outer aspect of muscles of patagium of left wing of a bird. (*Rhamphastos cuvieri*). After Ganod, slightly reduced. *tp. l.*, tensor patagii longus; *tp. b.*, tensor patagii brevis; *dt. p.*, dermo-tensor patagii; *e. m, r. l.*, extensor metacarpi radialis longus; *t.*, triceps; *b.*, biceps; *S. R.*, secondary reminges.

A remarkable group of muscles, the *tensor patagii muscles*, occur in the triangular patagium of the wing in all birds wherein the wing is well developed. These muscles, through their many describers, have come to play quite an important part in the classification of birds. Their variations, how-

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